

What is claimed is:

1. A process for making a deformable, hollow thermoplastic article comprising:
  - (a) providing an injection moldable flexible thermoplastic elastomer;
  - (b) providing a first mold; the mold comprising exterior mold front and rear sections and an interior core, the first mold comprising a parison injection station, wherein the exterior sections of the first mold are spaced apart from the interior core to define a cavity in the shape of a substantial portion of the article;
  - (c) assembling the exterior mold sections of the first mold thereby forming a planar junction between the exterior mold parts;
  - (d) injecting the elastomer into the first mold cavity to form a parison;
  - (e) opening the exterior mold parts of the first mold and transferring the rear section of the first mold and the parison to a blow station;
  - (f) providing a second mold at the blow station, the second mold comprising an exterior mold front section, the rear section of the first mold, and an interior core, wherein the exterior sections of the second mold are spaced apart from the interior core to define a cavity in the shape of the entirety of the hollow article;
  - (g) drawing a vacuum on, and injecting compressed gas into, the second mold, thereby dispersing the parison relatively evenly, and with a substantially uniform thickness, against the second mold cavity interior surface to form the hollow article, the hollow article having an opening for removing the interior core, the diameter of the opening being smaller than the diameter of the core to pass through the opening;
  - (h) cooling the dispersed parison, thereby causing it to set and form the hollow article segment; and
  - (f) separating the second mold interior core from the hollow article.
2. The process of claim 1, wherein the parison injection station pressure is from about 200 psi to about 1000 psi, the second mold cavity vacuum pressure ranges from about -7 psig to about -14.5 psig, and the pressure of the compressed gas injected into the second mold ranges from about 80 psig to about 1000 psig.

3. The process of claim 2, wherein the parison injection station temperature is from about 150° C to about 300° C and the temperature of the compressed gas injected into the second mold ranges from about 30° C to 40° C.
4. The process of claim 3, wherein the elastomer is injected into the first mold cavity over a period of from about 0.2 to about 6 seconds and the cooled and dispersed parison sets within the second mold in about 5 seconds to about 90 seconds.
5. The process of claim 1, wherein a vacuum is drawn upon the first mold cavity for a few seconds prior to the end of the elastomer injection period.
6. The process of claim 1, wherein the elastomer is a material selected from the group consisting of optionally hydrogenated styrene-ethylene/butylene-styrene (S-EB-S), styrene-butadiene-styrene (S-B-S), styrene-isopropene-styrene (S-I-S), styrene-diene, styrene-isoprene and styrene-butadiene block copolymers.
7. The process of claim 1, wherein the elastomer is a KRATON® block copolymer having an elasticity ranging between about two hundred fifty to five hundred fifty percent.
8. The process of claim 1, wherein (a) a vacuum is drawn on the second mold through a valve pin inserted through the second mold cavity, and (b) pressurized gas is injected into the second mold cavity through a movable core pin.
9. The process of claim 1, wherein a vacuum is drawn on, and compressed gas is injected into, the second mold relatively simultaneously.
10. The process of claim 1, wherein: (a) the deformable, hollow thermoplastic article is a hollow doll head with ears and a hair line, the hair line forming a substantially continuous circle extending around the top of the head and above the ears; and (b) the first mold interior core defines a cavity in the shape of the portion of the hollow doll head below the hair line.
11. The process of claim 1, wherein the interior core of the second mold includes a core ejector pin and a core sleeve surrounding the pin, and upon separation of the second mold

interior core from the deformable hollow thermoplastic article the core sleeve is retained in a fixed position relative to the ejector pin and the ejector pin is forced up against the deformable hollow thermoplastic article to push the deformable hollow thermoplastic article off of the core sleeve, thereby removing the deformable hollow thermoplastic article from the ejector pin.

12. The process of claim 1 wherein the interior core of the second mold includes a hollow conduit in communication with the interior of the deformable hollow thermoplastic article -forming cavity, and a pressurized gas is blown through the conduit and into the hollow interior of the deformable hollow thermoplastic article to separate it from the second mold interior core.

13. The process of claim 1 wherein the second mold is designed with a pre-determined ratio of the diameter of the core relative to the diameter of the opening to allow removal of the core through the opening, said pre-determined ratio being less than a maximum stretchability limit of the opening of deformable hollow thermoplastic article to be formed from the flexible thermoplastic elastomer.

14. The process of claim 13, wherein the thermoplastic elastomer is a S-B-S copolymer, and the pre-determined ratio is more than about two.

15. The process of claim 1, further comprising: (a) placing a removable object onto the surface of the interior core of the second mold; (b) assembling the exterior parts of the second mold around the core and removable object; and (c) overmolding the removable object with the thermoplastic elastomer when the parison is dispersed within the second mold cavity interior surface, such that the removable object is retained in the deformable hollow thermoplastic article when the interior core is removed.

16. The process of claim 15, wherein the thermoplastic elastomer overmolds only a portion of the removable object such that the removable object protrudes through the exterior surface of the deformable hollow thermoplastic article.

17. The process of claim 16, wherein the removable object is a doll eye and the deformable hollow thermoplastic article is a doll head.

18. The process of claim 1, further comprising placing at least one portion of an exterior part of the first mold in contact with the interior core to define at least one opening to be formed in the deformable hollow thermoplastic article.

19. The process of claim 18, further comprising placing an article into at least one of said openings formed by the contact between the exterior mold part and interior core after the deformable hollow thermoplastic article is removed from the second mold interior core.

20. The process of claim 10, further comprising removing the head from the second mold interior core, wherein the second mold interior core comprises at least two separable sections, and the hollow doll head is removed from the second mold interior core by separately and individually removing each separable core section from the head through the opening.

21. The process of claim 1, wherein at least one of the interior core separable sections of the second mold is a key section that must be removed first to allow other separable sections to be later removed.

22. The process of claim 21, wherein after the interior core separable sections of the second mold are removed from the deformable hollow thermoplastic article, the sections are reassembled and replaced in the exterior of the second mold for forming another deformable hollow thermoplastic article.

23. The process of claim 10, further comprising rooting hair-material to the top of the doll head above and below the part line with a sufficient density such that the part line is not observable to an ordinary observer holding the doll at arms length.

24. A process comprising making a deformable hollow doll head with ears and a parting line forming a substantially continuous circle extending around the top of the head and above the ears by:

- (a) providing an injection moldable flexible thermoplastic elastomer;
- (b) providing a first mold for the doll head, the mold comprising exterior mold sections and an interior core, the first mold comprising a parison injection station, wherein the exterior sections of the first mold are spaced apart from the interior core to define a cavity

- in the shape of that portion of the doll head extending below the parting line;
- (c) assembling the exterior mold sections of the first mold to form a planar junction between the exterior mold parts corresponding to the doll head parting line;
  - (d) injecting the elastomer into the first mold cavity to form a parison;
  - (e) opening the exterior mold parts of the first mold and transferring the rear section of the first mold and the parison to a blow station;
  - (f) providing a second mold at the blow station, the second mold comprising an exterior mold front section, the rear section of the first mold, and an interior core, wherein the exterior sections of the second mold are spaced apart from the interior core to define a cavity in the shape of the entirety of the hollow doll head;
  - (g) drawing a vacuum on, and injecting compressed gas into, the second mold, thereby dispersing the parison relatively evenly, and with a substantially uniform thickness, against the second mold cavity interior surface to form the hollow doll head, the hollow head having an opening for removing the interior core, the diameter of the opening being smaller than the diameter of the core to pass through the opening;
  - (h) cooling the dispersed parison, thereby causing it to set and form the hollow doll head; and
  - (f) separating the second mold interior core from the hollow doll head.

25. The process of claim 24, wherein the parison injection station pressure is from about 200 psi to about 1000 psi, the second mold cavity vacuum pressure ranges from about -7 psig to about -14.5 psig, and the pressure of the compressed gas injected into the second mold ranges from about 80 psig to about 1000 psig.

26. The process of claim 25, wherein the parison injection station temperature is from about 150° C to about 300° C and the temperature of the compressed gas injected into the second mold ranges from about 30° C to 40° C.

27. The process of claim 26, wherein the elastomer is injected into the first mold cavity over a period of from about 0.2 to about 6 seconds and the cooled and dispersed parison sets within the second mold within sets within the second mold in about 5 seconds to about 90 seconds.

28. The process of claim 24, wherein a vacuum is drawn upon the first mold cavity for a few seconds prior to the end of the elastomer injection period.
29. The process of claim 24, wherein the elastomer is a material selected from the group consisting of optionally hydrogenated styrene-ethylene/butylene-styrene (S-EB-S), styrene-butadiene-styrene (S-B-S), styrene-isopropene-styrene (S-I-S), styrene-diene, styrene-isoprene and styrene-butadiene block copolymers.
30. The process of claim 24, wherein the elastomer is a KRATON® block copolymer having an elasticity ranging between about two hundred fifty to five hundred fifty percent.
31. The process of claim 24, wherein (a) a vacuum is drawn on the second mold through a valve pin inserted through the second mold cavity, and (b) pressurized gas is injected into the second mold cavity through a movable core pin.
32. The process of claims 1 and 8, wherein a vacuum is drawn on, and compressed gas is injected into, the second mold relatively simultaneously.
33. The process of claim 24, wherein the interior core of the second mold includes a core ejector pin and a core sleeve surrounding the pin, and upon separation of the second mold interior core from the doll head the core sleeve is retained in a fixed position relative to the ejector pin and the ejector pin is forced up against the doll head to push the doll head off of the core sleeve, thereby removing the doll head from the ejector pin.
34. The process of claim 24, wherein the interior core of the second mold includes a hollow conduit in communication with the interior of the doll head -forming cavity, and a pressurized gas is blown through the conduit and into the hollow interior of the doll head to separate it from the second mold interior core.
35. The process of claim 24, wherein the second mold is designed with a pre-determined ratio of the diameter of the core relative to the diameter of the opening to allow removal of the core through the opening, said pre-determined ratio being less than a maximum stretchability limit of the opening of doll head to be formed from the flexible thermoplastic elastomer.

36. The process of claim 35, wherein the thermoplastic elastomer is a S-B-S copolymer, and the pre-determined ratio is more than about two.

37. The process of claim 24, further comprising: (a) placing a removable object onto the surface of the interior core of the second mold; (b) assembling the exterior parts of the second mold around the core and removable object; and (c) overmolding the removable object with the thermoplastic elastomer when the parison is dispersed within the second mold cavity interior surface, such that the removable object is retained in the doll head when the interior core is removed.

38. The process of claim 37, wherein the thermoplastic elastomer overmolds only a portion of the removable object such that the removable object protrudes through the exterior surface of the doll head.

39. The process of claim 38, wherein the removable object is a doll eye.

40. The process of claim 24, further comprising placing at least one portion of an exterior part of the first mold in contact with the interior core to define at least one opening to be formed in the doll head.

41. The process of claim 40, further comprising placing an article into at least one of said openings formed by the contact between the exterior mold part and interior core after the doll head is removed from the second mold interior core.

42. The process of claim 41, further comprising the step of removing the head from the second mold interior core, wherein the second mold interior core comprises at least two separable sections, and the doll head is removed from the second mold interior core by separately and individually removing each separable core section from the doll head through the opening.

43. The process of claim 24, wherein at least one of the interior core separable sections of the second mold is a key section that must be removed first to allow other separable sections to be later removed.

44. The process of claim 43, wherein after the interior core separable sections of the second mold are removed from the doll head, the sections are reassembled and replaced in the exterior of the second mold for forming another doll head.

45. The process of claim 24, further comprising rooting hair-material to the top of the doll head above and below the part line with a sufficient density such that the part line is not observable to an ordinary observer holding the doll at arms length.